

EXHIBIT B

1
2 UNITED STATES DISTRICT COURT
3 FOR THE NORTHERN DISTRICT OF CALIFORNIA
4 SAN JOSE DIVISION
5

6 In Re Google, Inc., Privacy Policy Litigation.

Case No. 5:12-cv-01382

7 REPORT OF FERNANDO TORRES ON
8 THE DAMAGES TO PLAINTIFFS
9 FROM GOOGLE'S VIOLATIONS OF
10 ANDROID USERS' PRIVACY RIGHTS

11 Date: March 12, 2015
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13
14

15 I, FERNANDO TORRES, declare and state as follows:

16
17 1. I have been retained as an expert by attorneys for Plaintiffs to consult concerning the
18 factual and damages issues presented in the above case. Specifically, I have been tasked with
19 analyzing the economic damages due to Defendant Google, Inc.'s ("GOOGLE") breach of the
20 privacy policies and other contracts that govern the rights of Android Users during the Class
21 Period (February 1, 2009 to May 31, 2014).

22 2. I am a professional economist and have over 30 years' experience in applied and
23 theoretical economics. In the course of this experience, I have been a consultant, a professor,
24 and a business manager. Both my undergraduate and post-graduate degrees are in economics,
25 the latter with a concentration in econometrics. Since 2004, I have specialized in the analysis
26 and valuation of intellectual property and intangible assets. I am a member and Chief
27 Economist at IPmetrics LLC, an intellectual property consulting firm. Appendix A, attached
28 hereto, contains a copy of my most current curriculum vitae setting forth in detail my

1 qualifications and experience, as well as list of all publications authored in the previous 10
2 years.

3 3. Moreover, I have served as a consultant on numerous projects involving the
4 determination of the value of intellectual property, including patents, trademarks, and rights of
5 publicity. I have trial and deposition experience as an expert witness representing both
6 plaintiffs and defendants. I have experience determining damages in complex commercial
7 litigation cases nationally, including a class action case. I currently consult with and have
8 consulted with clients in California, New York, Texas, Colorado, Iowa, and Florida. Appendix
9 B, attached hereto, contains a listing of my testimony-related experience for the past four years.

10 4. In the course of this engagement, I have conducted research relying on publicly
11 available information. After reviewing and analyzing the material available to me and after
12 conducting further research surrounding the relevant issues, I have come to the findings and
13 conclusions that are addressed in the following paragraphs including, beginning with general
14 considerations and proceeding to examine specific issues of the case at hand. The facts and data
15 considered in forming the opinions are identified where referenced in the text and footnotes that
16 follow.

17 5. **Background.** — This case is a class action against GOOGLE on behalf of all persons
18 and entities in the United States that purchased at least one paid Android application through
19 the Android Market and/or Google Play Store between February 1, 2009 and May 31, 2014 (the
20 “Android App Disclosure Subclass”).¹

21 6. GOOGLE acquired Android, Inc. in the fall of 2005,² and the first commercial version
22 of the Android operating system software (Android OS) was released on September 23, 2008.³
23 The stated goal was for the partners of the “Open Handset Alliance” to begin developing a new
24
25

26 ¹ *Third Amended Complaint* at §1.

27 ² Elgin, Ben (August 17, 2005). *Google Buys Android for Its Mobile Arsenal*, Bloomberg Businessweek.
www.webcitation.org/5wk7slvVb).

28 ³ Dan Morrill (September 23, 2008), *Announcing the Android 1.0 SDK, release 1*, Android Developers Blog
(android-developers.blogspot.com/2008/09/announcing-android-10-sdk-release-1.html).

category of mobile hardware and software products.⁴ Several handset manufacturers immediately adopted this platform, which is distributed under royalty-free, open-source based licensing.⁵ During the past few years, the Android OS has continued development, is now distributing version 5.0, and has been widely adopted in mobile communications. According to public information from GOOGLE, the Android OS "...powers hundreds of millions of mobile devices in more than 190 countries around the world. It's the largest installed base of any mobile platform and growing fast—every day another million users power up their Android devices for the first time and start looking for apps, games, and other digital content."⁶

7. GOOGLE requires that users of Android devices create an account to access Google Play (formerly known as the Android Market), which is the primary service through which Android users purchase or otherwise acquire apps for their devices.⁷ At all times during the Class Period, GOOGLE agreed that it would not disclose personal information of Android Users to third parties except under limited circumstances (for example, "as necessary to process your transaction and maintain your account"⁸).

8. **Alleged Damaging Act.**— Since approximately February 1, 2009, GOOGLE has subjected Android device users to injury by secretly and automatically disclosing to third-party application developers certain personal information of users that purchase applications through the Android Market/Google Play Store, without such users' authorization or consent.⁹ The disclosed information includes at least the name, email address, and physical or geographical location associated with the Google account and/or Android device.¹⁰ From an economic perspective, this breach of contract causes quantifiable damages to the members of the Subclass. Furthermore, to the extent this information disclosure may require transmission

⁴ The OHA is a group of 84 technology and mobile companies that have come together to accelerate innovation in mobile and offer consumers a richer, less expensive, and better mobile experience (www.openhandsetalliance.com/oha_faq.html).

⁵ A distinction is often necessarily made between the open-source Android OS, which developers can use as-is or develop derivative versions (technically "fork" the open-source Android project), and Google's proprietary applications, including the well-known Search, Gmail, Google Maps, etc. The latter are licensed separately by Google, Inc. under proprietary terms and conditions (Ron Amadeo (October 20, 2013), *Google's iron grip on Android: Controlling open source by any means necessary*. ArsTechnica.com).

⁶ Google, Inc. Android Developers website (developer.android.com/about/index.html, accessed March 4, 2015).

⁷ *Complaint* at §16.

⁸ *Complaint* at §137.

⁹ *Complaint* at §17.

¹⁰ *Complaint* at §17.

1 involving the Subclass members' mobile devices, there are additional unreimbursed costs
2 imposed on users.

3 9. From an economic perspective, the contract entered into forms one side of the two-
4 sided GOOGLE platform: GOOGLE provides internet-based services to attract consumers to
5 the platform, on the one hand, and on the other GOOGLE sells access to these consumers to
6 commercial entities like advertisers and, relevant here, mobile application developers.¹¹
7 Through the Android OS, the GOOGLE platform is extended from the stationary web-based
8 service to the growing mobile device-based environment of Android OS phones and devices.
9 Economically, this is a competitive necessity as an increasing proportion of consumers'
10 attention is directed to mobile devices, rather than traditional personal computers and
11 television.¹² The other side of GOOGLE's two-sided platform concerns GOOGLE's receipt of
12 revenues in exchange for access to information about Android Users, which in the case of
13 application developers takes the form of a percentage-based charge applied to all sales of
14 applications made through the Android Market/Google Play Store.

15 10. Without first obtaining users' authorization to do so, GOOGLE has, for the duration of
16 the Class Period, caused certain personal information of every Android OS user that makes an
17 app purchase through GOOGLE's Play Store¹³ to be disclosed to the application developer.¹⁴
18 The information thus disclosed is not necessary for the third party (that is, the app developers)
19 in processing the payment or for maintaining the user's account,¹⁵ and none of the other
20 specific conditions permitting disclosure to third parties seems remotely applicable in this
21 case.¹⁶

22
23 ¹¹ The two-sided market is well-known in Economics from the study of entertainment platforms that pre-date
24 internet-based platforms like GOOGLE's. See, *inter alia*, See, *inter alia*, H.L. Vogel, Entertainment Industry
25 Economics, 8th Ed., 2011, Cambridge University Press pp 337-339; and, S.P. Anderson and J. Gabszewicz, The
26 Media and Advertising: a Tale of Two-Sided Markets, in Handbook of the Economics of Art and Culture, Volume
27 1, Edited by V.A.Ginsburgh and D.Throsby, Elsevier, 2006, pp 567-614.

28 ¹² According to recent Nielsen findings, US adults spent on average 34 hours per month using the mobile internet
on smartphones. By comparison, they spend 27 hours on the PC internet (See: The U.S. Digital Consumer Report
(www.nielsen.com/us/en/insights/reports/2014/the-us-digital-consumer-report.html)).

¹³ Initially referred to as the Android Market.

¹⁴ *Complaint*, at §67.

¹⁵ *Complaint* at §128 *et seq.*

¹⁶ See: *Complaint* at §132-135.

1 11. In this report, I am assuming that the dissemination actions taken are considered as a
 2 breach of contract,¹⁷ and proceed to analyze the compensation for the consequent damages
 3 from an economic perspective. I understand that Plaintiffs in this case are entitled, under
 4 established California contract law, to monetary relief as a result of GOOGLE's invasion of
 5 their privacy interests, that is, their interest in not having their personally-identifying
 6 information – name, e-mail address and location – shared with third parties without their
 7 consent or authorization.

8 **12. Economic Analysis.** – The economics of this injury to the Subclass members' privacy
 9 interests can be analyzed from different perspectives, but the general context is that of the
 10 bargain that is struck between GOOGLE and the users of the Android services considered in
 11 this case; GOOGLE provides the Android platform and access to its services, including the
 12 Android Market/Play Store, as well as the payment tool Google Wallet, at no charge to users, in
 13 exchange for accessing user's information and activity under the terms of the privacy
 14 provisions of the corresponding services, namely, that no *personally identifiable* information
 15 will be shared with or sold to third parties except in limited circumstances (none of which is
 16 applicable here).¹⁸ Economically, this context involves two concepts: informational privacy is
 an economic good; and, there is a market for private information.

17 13. The personal information GOOGLE collects and disseminates in breach of the
 18 contracts at issue (name, email, location) is valued by and valuable to the users (the members of
 19 the Subclass in this case). Conceptually, information privacy is an individual's ability to
 20 control the collection and use of personal information.¹⁹ Explicitly, access to users'
 21 preferences, browsing history, and demographic characteristics is loosely understood as the
 22 user's end of the bargain to use GOOGLE services, but not the dissemination of personally
 23 identifiable information, which is much less associated with the rest of the user's activity
 24 profile. Thus, while the notion that, "If you are not paying for it, you are the product"²⁰ has to
 25 some degree been internalized by Internet users, they also perceive privacy invasions when

26 ¹⁷ *Complaint* at §271 *et seq.*

27 ¹⁸ Summarizing the substantive allegations in the *Complaint*, specifically at §78 *et seq.*

28 ¹⁹ See: I. Hann *et al.* "Overcoming Online Information Privacy Concerns: An Information-Processing Theory Approach" in *Journal of Management Information Systems*, Fall 2007, Vol. 24, No. 2, p 16.

²⁰ Popularized as a result of the user "revolt" arising from substantial changes to the Digg.com "free" service in 2010 (See: <http://www.metafilter.com/95152/Userdriven-discontent>).

1 they are not granted sufficient control on the solicitation, storage, use, and disclosure of
2 personally identifiable information.²¹

3 14. Therefore, as a direct consequence of the alleged breach of contract, personally
4 identifiable information of the members of the subject Subclass has been taken by GOOGLE
5 and communicated to undefined third-party application developers. The information has value,
6 and like all commodities in the marketplace, it has different value for different parties. Users
7 value the privacy of their information; GOOGLE and the developers value the information
8 because it can be leveraged to obtain advertising or other types of revenue. Because GOOGLE
9 has disclosed this information to the application developers, the members of the Subclass have
10 lost the sales value of that information that they otherwise would have had. In short, the
11 Subclass members have lost the opportunity to sell the personal information that GOOGLE
12 discloses to third-party application developers, the monetary value of which is at least as much
13 as the value that such third parties place on the information.

14 15. In addition, once the personally identifiable information is disseminated, out of both
15 the users' and even GOOGLE's control, its security is at risk to the extent third party
16 developers²² cannot be reasonably expected to guard the disclosed information with the
17 requisite level of data security that GOOGLE may have, but for which the developers do not
18 have resources. In fact, it is clear that even some of the largest and most sophisticated
19 companies have shown to be vulnerable to hacking attacks and to lose valuable, private and,
20 supposedly, secure information.²³ Finally, even if the information wrongly disseminated by
21 GOOGLE is deemed to be available to advertisers through other Internet services conceivably
22 used by the members of the Subclass, targeting advertising at a granular level can lead to data
23

24 ²¹ *Ibid*, p 17.

25 ²² I have not seen the list of third party developers that have received private information, but since the barriers to
26 entry into the Google Play store are low (a one-time \$25 dollar registration fee, and a Google account, is all that is
27 needed to publish an app and access the Google Play Developer Console
(<https://play.google.com/apps/publish/signup/>), I expect that the usual concentrated market, long-tail, distribution
28 prevails; with a few large publishers and a majority of smaller entities or even individuals with small portfolios of
applications.

²³ The recent breaches at Target Stores, Home Depot, Anthem – Blue Cross/Blue Shield, and even JP Morgan
Chase are salient examples of this risk (See also: <http://www.pcworld.com/article/2453400/the-biggest-data-breaches-of-2014-so-far.html>).

1 breaches in other platforms to the extent the name, email address and location pieces of
2 information narrow identification when cross-referenced in data banks, or exploited.²⁴

3 16. To objectively quantify the value of the privacy interests injured by the alleged
4 wrongful conduct in this case, attention must be paid to several dimensions of the consequences
5 of the breach at issue: (a) the information itself is an intangible commodity; (b) the Subclass
6 members have an interest in keeping the information private; (c) the information has potential
7 commercial value when used by third parties; and (d) the Subclass members incur incremental
8 costs²⁵ to cover the additional risks imposed by the unauthorized disclosures to parties with
9 whom the Subclass members do not have a privacy agreement. I have considered, researched,
10 and analyzed market prices for the various valuation approaches as follows:

- 11 a. The market value of the private, personally identifiable information that has lost
12 its private character is measurable by the prices paid for consumer email
13 databases for mass marketing purposes. This is a baseline, no-less-than value of
14 the wrongly disclosed information itself as the email information typically sold
15 for these purpose is unqualified (*i.e.*, it is unknown if the consumer is a suitable
16 target for the marketing campaign) and has problems of staleness (*i.e.*, the
17 information may be old and no longer valid).
- 18 b. The market value of the privacy interest in the information at issue can be
19 objectively measured by empirical means; based on experimental designs aimed
20 at quantifying the monetary amounts required to motivate individuals to disclose
21 personal information in an online setting in exchange for protection against
22 errors, improper access, and secondary use by third parties.
- 23 c. The market value of private information can be considered as having as another
24 reference the amount typically expected from leveraging of the information in
25 the market by the recipients of the information. Specifically, by reference to the
26 average (advertising) revenue per user Android app developers attain. The latter

27 ²⁴ See; A. Korolova, "Privacy Violations Using Microtargeted Ads: A Case Study", Journal of Privacy and
28 Confidentiality (2011) Vol. 3, No. 1 pp 27-49. Repository.cmu.edu/jpc

²⁵ Either insuring or implicitly self-insuring against these risks.

would, of course, not be rationally inclined to pay more for the information than the amount they expect to receive in revenue, and would likely aim to pay much less considering the likelihood of success of typical online advertising campaigns.

d. Considering the incremental risk associated with the dissemination of private, personally identifiable information to third parties, a measure of value is available considering the increased cost borne by the Subclass members in terms of the potential misuse of such information. In this regard, a portion of the Subclass may be reasonably expected to actively engage in monitoring future potential misuses, others may only incur basic, passive steps, and yet others may not take any action in response to the increased risk.

e. To the extent the transmission of Android users' private information takes place using the broadband access and consumes battery power from users' mobile handsets, the Subclass members suffer additional damages due to the cost of these resources.²⁶

17. Baseline Market Value – The cost of acquiring email addresses in specific zip codes, as stated above, is the minimum value of the private information disseminated by GOOGLE. The information at issue, moreover, is of higher quality than that typically sold for marketing purposes. The databases containing this type of information cannot represent to information purchasers that their contents are current, validated email addresses for individuals with sufficient resources to have active mobile phone service on sophisticated phones or mobile devices and that have spent money for premium applications for those phones and devices. Nevertheless, researching this market for email lists for marketing purposes, I found the market price to be in the range of \$0.015²⁷ for an unqualified list, to \$0.07 for residential consumers, to \$0.18 per name for a more specific list of recent movers and new homeowners per unique email

²⁶ *Complaint* at §18, §144.

²⁷ For example, I requested EMAILZIPCODE.NET for a quote for email addresses within a five mile radius of my business location and found that a database of 28,555 records would cost \$428.32, for an average per record of \$0.015 (emailzipcode.net/buyemailaddresses.php, accessed January 26, 2015).

1 address.²⁸ From this survey of the market, and given the considerations as to qualified leads,
 2 the most comparable proxy for the case at hand is the **\$0.18 per name** price. Putting aside any
 3 privacy value of the information (*i.e.*, the set of name, email, and location), this is an indication
 4 of its market value as an informational input for marketing purposes.

5 18. Android OS users, as most Internet users, are generally concerned about the potential
 6 disclosure and misuse of information collected while online or using applications on their
 7 mobile devices. To mitigate these privacy concerns, Internet companies offer privacy policies
 8 and technical protections. Generally, individuals' motivation to disclose private information
 9 results from incentives offered by online websites. The central incentive is adhering to privacy
 10 policies and, where applicable, regulations.²⁹ Other relevant mechanisms are financial (*e.g.*,
 11 discounts) and convenience incentives. In this context, the amount of the incentive necessary
 12 for the voluntary disclosure of private information has been the subject of several experimental
 13 studies that provide an objective measure of the monetary value of the privacy interest to the
 14 provider of the information: a threshold to overcome the objection to disclose.

15 19. One such study utilized experimental auctions, where participants put a dollar value on
 16 private information before revealing it to a group.³⁰ A clear outcome of those experiments was
 17 that the price demanded to reveal private information, while not significantly different between
 18 men and women, was strongly related to the difference between the individual's information
 19 and the perceived desirability of that private trait.³¹ The average prices demanded to reveal a
 20 particular piece of private information ranged from \$57.56 (age) to \$74.06 (weight).³² In this
 21 context, this study showing statistically significant results is particularly relevant to the case at
 22 hand in that it provides evidence of the trade-off between privacy and money: to overcome the
 23 user's interest in maintaining information as private, there is a measurable monetary threshold
 24 amount for which, on average, consumers will exchange that privacy.

25 ²⁸ I obtained these quotes from market leading firm Vista Print (<http://www.vistaprint.com/maillinglists.aspx>).

26 ²⁹ In the US, these regulations pre-date the wide spread use of the Internet, such as the 1974 Privacy Act, and notably include the 1998 Children's Online Privacy Protection Act and the 2003 California Online Protection Act, among others.

27 ³⁰ B. A. Huberman, E. Adar, L. R. Fine (Hewlett-Packard Labs), "Valuating Privacy" in: IEEE Security & Privacy, 2005-09 (Digital Edition), IEEE Society, pp 22-25 (www.computer.org/csdl/mags/sp/2005/05/j5022-abs.html).

28 ³¹ The experimental auctions included private information on weight, age, salary, credit rating, and savings.

³² Huberman, et al, *op. cit.*, p 24.

20. Another empirical study investigated Internet users' monetary appraisal of private personal information.³³ Specifically, that experiment showed that outcomes such as monetary rewards are associated with positive motivation to disclose information to a website.³⁴ Generally, the statistically significant results imply that websites would need to offer substantial monetary incentives to overcome individuals' privacy concerns, regarding errors, improper access and unauthorized secondary use³⁵ of information.³⁶ The following table summarizes the results of the valuation of these three aspects of website privacy policy.

Table 1
Value of Privacy
Experimental Results³⁷

Web site privacy policy	Range of Value (US\$)	
Review for error	\$ 11.18	\$16.36
Restriction against improper access	\$ 11.33	\$16.58
Secondary use not allowed	\$ 7.98	\$11.68

21. According to this study among US subjects, protection against errors, improper access, and secondary use of personal information is worth between \$30.49 and \$44.62.³⁸ To apply these results to the case at hand, it would be appropriate to exclude the error protection from consideration and focus on the "access" and "unauthorized use" elements. Thus, in my opinion, a likely range of value for Subclass members' interests in the privacy of their personally identifiable information from unauthorized access and dissemination to third parties would be estimated in the range between \$19.31 and \$28.26.

22. Considering the economic rationale for GOOGLE to knowingly make available to third parties the private information obtained from the members of the Subclass, despite the provisions of the privacy policies and restrictions of the various services that collect and process that information in the first place (such as the general GOOGLE privacy policy and the

³³ I. Hann *et al.* "Overcoming Online Information Privacy Concerns: An Information-Processing Theory Approach" in *Journal of Management Information Systems*, Fall 2007, Vol. 24, No. 2, pp 13-42.

³⁴ *Ibid.*, p 27.

³⁵ Secondary use refers to the concern that information is collected for one purpose but is used for another, secondary purpose. *Ibid.*, p 19.

³⁶ *Ibid.*, p 29.

³⁷ *Ibid.*, Table 3. p 30.

³⁸ Adding the three components in the Table.

Google Wallet policies), it bears noting GOOGLE is already in possession of the information and can use it to generate advertising revenue. In fact, based on GOOGLE's publicly disclosed financial information, analysts estimate that between 2012 and 2014 during the period at issue, GOOGLE earns annual revenue of \$41.11 on average per user ("ARPU").³⁹ This amount reflects all lines of service and advertising outlets in the GOOGLE platform.

23. Defendant GOOGLE evidently uses the improperly disclosed private, personally identifying information to provide additional value to third party Android Developers as part of the Play Store services. GOOGLE participates in the revenue derived from paid apps and in-app purchases performed using the Google Wallet platform. As part of the value proposition GOOGLE makes to Android Developers, in exchange for a 30% participation in the paid-app and in-app purchase revenue,⁴⁰ Android Developers received direct access to Plaintiffs' and the other Subclass members' private, personally identifying information during the Class Period. This disclosure, although breaching the user privacy agreements which are the subject of this case, adds value to the further expansion of the Android market, its attractiveness for developers, and thus supports the expansion of GOOGLE's mobile market share.

24. In the advertising-supported Internet marketplace, Android users' personally-identifying information has value to both Android users (who value the privacy of such information, including the ability to control its dissemination) and the Android Developers (who value the multiple uses such information has). In the hands of developers, the improperly communicated private information of the Subclass members can be leveraged in several ways, for example, in targeting advertising for the developer's other products, or by participating in any of the multiple advertising networks operating on the Internet today.⁴¹ In this context, the

³⁹ Simple average of the ARPU from SEC filings as calculated by Digital Strategy Consulting, in: http://www.digitalstrategyconsulting.com/intelligence/2014/06/ad_revenue_per_user_google_facebook_twitter.php.

⁴⁰ Generally, I understand from my review of the Internet Technology media and various sources that Google, Inc., Amazon.com, Inc., and Apple, Inc. all participate in the same 30/70 split on revenue generated through their respective mobile application stores (Google Play, Amazon Marketplace, and the App Store, respectively). See: Google Developer Support (support.google.com/googleplay/android-developer/answer/112622?hl=en), Apple Developer Guidelines (developer.apple.com/app-store/review/guidelines/#purchasing-currencies), and Amazon Program Overview ([https://developer.amazon.com/appsandservices/support/faq](http://developer.amazon.com/appsandservices/support/faq)).

⁴¹ In the current marketplace, even the limited pieces of information at issue (name, email, location) can be significantly leveraged when used to design targeted advertising campaigns across services such as Facebook's Custom Audiences product, whereby advertisers can cross reference the email addresses thus obtained with

1 average Android developer⁴² is estimated to earn average revenue of **\$1.25** per user (ARPU).⁴³
 2 Evidently, GOOGLE is in a better position to leverage user information than developers, but
 3 both parties can extract several orders of magnitude of incremental value by using the private
 4 information at issue, relative to the market cost of obtaining generic email data.

5 25. As a result of the unauthorized disclosure of Plaintiffs' information to Android
 6 Developers, the former also suffer a total loss of control over the private information they
 7 value. The disclosed information comes to developers from GOOGLE, but its disclosure is not
 8 part of the contract between the developers and Plaintiffs and the other Subclass members.
 9 Once the personally identifiable information is in the hands of these unrelated parties, the risk
 10 arises that:

- 11 a. The developers may make secondary use of the information, such as targeted
 12 marketing;
- 13 b. The developers may make the information available to other third parties for
 14 marketing or other uses;
- 15 c. The developers' servers housing the information may be subject to security
 16 breaches and, thus, the information may be released to nefarious parties.
 17

18 26. Thus, an additional element of value to consider in appraising the damages that result
 19 from the contract breach at issue is to estimate the incremental value of safeguarding against
 20 further misuse of the information. From an economic perspective, this type of risk implies an

21 Facebook's complete set of identifying characteristics (See Facebook.com advertisers website at
 22 facebook.com/business/products/advanced-ads).

23 ⁴² This measure could be considered overly inclusive in terms of the revenue generating activities available since
 24 the developers receiving the improperly disclosed personal information of the Subclass members are selling the
 25 application, rather than using an ad-supported model, or selling in-app purchases which often eliminate ads from
 26 applications. Nevertheless, as an average, it consolidates the information from the variety of application
 27 monetization business models. The average is appropriate in this economic analysis as the market value since it
 28 results from the balance of revenue generation alternatives (paid, freemium, ad-supported, etc.).

⁴³ This is the average for publicly available data between December 2009 and June 2014. As detailed in Exhibit A
 to this Report, the data is weighted by: (a) the market share of each Android OS version, [from data provided on
 Android OS ARPU reported by app monetization technology firm Tapjoy, Inc. in: "Android Fragmentation: How
 to pick the Right OS" in: Tapjoy Insights, Issue 4, October 2012]; (b) the number of Android OS handset
 subscribers in the USA (Survey Data from Comscore's MobiLens compiled by The Guardian); and (c) by weights
 reflecting the share of devices per Android OS version Android Developers website, data compiled from Google
 Play data by Google, Inc. (<http://developer.android.com/about/dashboards/index.html>).

1 additional cost to the user whose information has been disseminated; there is a probability of
 2 identity theft, aggregation with other sensitive information, and other acts which may impose
 3 additional expenditures by the legitimate owner of the information to find, mitigate, or
 4 counteract. The situation at hand is, in this respect, analogous to the consequences of an
 5 inadvertent data breach, such as the recent private data lost to hackers at retailers, banks or
 6 insurers; while not all users will be affected, which users will in fact be affected is not easily
 7 predictable. Consequently, measures are put in place for all users, such as putting a “security
 8 freeze” on a person’s credit report: Fees range from \$2 to \$15 per bureau, depending on the
 9 state of residence.⁴⁴ Another option is a credit/identity monitoring service is engaged to detect
 10 and, hopefully stop, misuses of the information. Market rates for such identity monitoring
 11 services usually range between \$10 and \$30 per month, depending on the range of features.⁴⁵

12 27. From the perspective of the incremental risk to which the Subclass members are now
 13 exposed as a direct result of the disclosure of their private information to third parties, the
 14 monetary amount needed in the market today to mitigate the risk and compensate Android
 15 users in covering the risk with a monitoring policy would cost between \$6 per user
 16 (considering the lowest cost of a security freeze on three credit bureaus) , and \$10/month per
user (considering the most basic identity monitoring service).⁴⁶

17 28. As far as the consumption of Subclass members’ resources, in terms of connectivity
 18 cost and power consumption is concerned, I researched market rates for such connectivity in
 19 the US during the Class Period. On average, between 2009 and 2014 the basic cost per MB
 20 (Megabyte) of mobile data use has declined and averaged \$0.068.⁴⁷ I would apply this unknit
 21 cost to the data used in the unauthorized transmission per occurrence when it becomes available
 22 for analysis.

23 ⁴⁴ Consumer Reports, February 2014, online edition (www.consumerreports.org/cro/news/2014/02/should-you-put-a-security-freeze-on-the-credit-file/index.htm).

24 ⁴⁵ Current information for Life Lock®, other services offer similarly priced plans with various options and
 25 features, such as Identity Guard®, Identity Force®, and credit bureaus such as Experian® and TransUnion®.

26 ⁴⁶ While a resourceful consumer can personally monitor his/her credit report using a staggered strategy with the
 27 free annual credit report available by law, the market value of the services considered serves as a proxy for the
 28 time and resources expended or foregone to implement this apparently zero-cost do-it-yourself mitigation.

⁴⁷ Year by year, the average cost per MB was 19¢ in 2009, 10¢ in 2010, 6¢ in 2011, 3¢ in 2012, 2¢ in 2013, and in
 2014 it averaged 1¢. Currently, a typical 5GB (Gigabyte = 1,024 MB) plan costs \$40/month in the US. Overall,
 the average for the period is 6.8¢(USD). Sources: Portio Research, “Mobile Data Usage Trends 2011-2015” 2011,
 p 14, and Open Technology Institute, “The Cost of Connectivity 2014” (Oct. 2014), p 20.

1 **29. Conclusions of Value.** – Having reviewed the Third Amended Complaint, and other
 2 documentation referenced in the report, and considering my experience in assessing damages,
 3 valuing intangibles, and conducting economic research, I have come to the following
 4 conclusions relevant to this case:

5 a. The damage imposed on the members of the Subclass as a result of the breach of
 6 contract resulting from the unauthorized and unnecessary disclosure of
 7 personally identifiable information to third parties is quantifiable in economic
 8 terms.

9 b. The foregoing direct and indirect effects of the breach damaged the privacy
 10 interests of Subclass members along a number of economically meaningful
 11 dimensions.

12 i. The personally identifiable information disclosed by GOOGLE in the
 13 breach is an economic good with a baseline market value estimated at
 14 **\$0.18** per set (name, email, and location).

15 ii. The Subclass members' interest in keeping the disclosed information
 16 private and secure was damaged irretrievably and its valuation for
 17 unauthorized access and dissemination to third parties can be estimated
 18 in the range between **\$19.31** and **\$28.26** per member.

19 iii. GOOGLE and the third party Android Developers having access and use
 20 of the Subclass members' private information benefit directly and
 21 indirectly in the form of acquiring purchase signals that can be leveraged
 22 for marketing/advertising purposes. The economic benefit to the
 23 breaching party can be estimated as the average revenue per user, net of
 24 the market value of the information, as no more than **\$40.93** in the

GOOGLE's possession⁴⁸ and \$1.07 in the possession of third party Android Developers.⁴⁹

- iv. The Subclass members' economic interests have also been damaged by the loss of control of their private information and its disclosure to third parties that have no further privacy obligation to them. The incremental costs imposed by the additional information risk is measurable as the cost of mitigation measures that are either purchased in the market by the affected users, or are opportunity costs the Subclass members must bear if personally monitoring the use of their private information. The costs of mitigating the additional risk imposed by the breach of contract are valued at no less than \$6.00 per user.
- v. Finally, the economic damage to Subclass Members for the unauthorized use of their mobile connectivity for GOOGLE to cause the unauthorized transmission of private information is estimated at \$0.068 per Megabyte, on average for the Class Period.

30. I declare under the penalty of perjury and under the laws of the State of California that the forgoing is true and correct and based upon my personal knowledge and/or professional opinions, and that if called upon to testify, I could verify the accuracy of the same. Furthermore, compensation related to this report is not dependent, in any way, upon the conclusions reached during the performance of the analysis (See Appendix C for details). This document was executed in the city of San Diego, California on March 12, 2015.

By: _____

Fernando Torres, MSc
Chief Economist
IPmetrics LLC

⁴⁸ This is the aforementioned GOOGLE ARPU (\$41.11) minus the market value of records consisting of name, email address and residential zip code cited before (\$0.18).

⁴⁹ This is the aforementioned Android developer ARPU (\$1.25) minus the market value of records consisting of name, email address and residential zip code cited before (\$0.18).

EXHIBIT A**Annual Device Market Shares by Android Version and
Average Revenue per User**

Android Version	Inception	2009	2010	2011	2012	2013	2014	ARPU
Version 1.1	2/9/2009	0.3%	0.1%					\$ 0.20
1.5 Cupcake	4/27/2009	27.7%	38.0%	2.0%				\$ 0.43
1.6 Donut	9/15/2009	54.2%	31.6%	2.0%	1.0%			\$ 0.44
2.0 Éclair	10/26/2009	17.8%	30.3%	23.5%	25.0%	1.0%		\$ 0.70
2.2 Froyo	5/20/2010			68.0%	60.0%	3.0%	0.5%	\$ 1.12
2.3 Gingerbread	12/6/2010			4.0%	4.0%	35.0%	14.0%	\$ 1.20
3.0 Honeycomb (Tablet only)	2/22/2011			0.5%	2.0%	1.0%	0.5%	\$ 0.97
4.0 Ice Cream Sandwich	10/18/2011				8.0%	24.0%	12.0%	\$ 1.19
4.1 Jelly Bean	7/9/2012					36.0%	55.0%	\$ 1.63
4.4 Kit Kat	9/3/2013						18.0%	\$ 1.53
5.0 Lollipop	11/12/2014							

Weighted Average ARPU	(2012 Prices)	\$0.48	\$0.51	\$1.00	\$1.01	\$1.34	\$1.49
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Number of Android OS Smartphones	(millions)	1.75	9.72	33.46	57.63	74.25	95.67
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Weighted average (2009-2014)	\$1.25
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Note:

Data for 2009 is as of December 2009, for 2010 – 2014 is for June of each year.

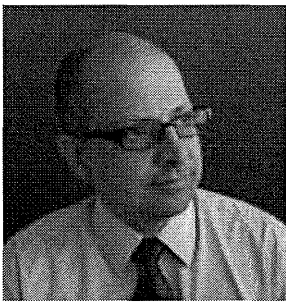
Sources:

- ARPU by Android Version: “Android Fragmentation: How to pick the Right OS” in: Tapjoy Insights, Issue 4, October 2012.
- Android Version Composition compiled from Android data:
<http://developer.android.com/about/dashboards/index.html>
- Number of Android OS handset subscribers in the USA compiled by The Guardian newspaper from survey data generated by Comscore’s MobiLens service (<https://www.comscore.com/Products/Audience-Analytics/MobiLens>).

1 **APPENDIX A**

2 **CURRICULUM VITAE AND PUBLICATIONS**

3
4 **FERNANDO TORRES, MSc**
5 **CHIEF ECONOMIST, IPMETRICS, LLC**
6



8 Fernando Torres is an intellectual property economist with nearly 30
9 years of work experience in economics, financial analysis, and
10 business management in the U.S. and Mexico. He is a member and
11 Chief Economist at IPmetrics LLC, an IP consulting firm specializing
12 in the strategic analysis, valuation, and expert witness assessment of
the full spectrum of intangible assets.

13 Since 2004, Mr. Torres has applied his economics, finance and business experience, as well as
14 skills in quantitative techniques, to the analysis and valuation of intangible assets, including
15 valuation for transactional and litigation purposes (bankruptcy and infringement cases). Prior
16 to joining IPmetrics, Mr. Torres served as Senior Economist at CONSOR[®] Intellectual Asset
17 Management.

18 During recent years, Mr. Torres has undertaken projects involving the valuation and/or the
19 assessment of infringement damages regarding copyrights, trademarks, patents, trade secrets,
20 rights of publicity, and other intellectual assets in such industries as commercial agriculture,
21 auto parts, apparel and footwear, retail, pharmaceuticals, entertainment, telecommunications,
22 and non-profit organizations, among others.

23 Mr. Torres regularly presents on topics related to intangible asset valuation in a variety of
24 venues, many of which qualify for CLE credit. During the past few years, Mr. Torres has been
25 an instructor for the course "Valuing Intangible Assets for Litigation," which is part of the
26 requirements of the Certified Forensic Financial Analyst designation issued by the National
27 Association of Certified Valuation Analysts (NACVA).
28

1 Mr. Torres has been active in the area of the copyright and rights of publicity infringement
2 issues, encompassing from the unlicensed use of celebrity images to a class action lawsuit
3 against the major social networking site.

4 Mr. Torres is also the editor and author of the online "Patent Value Guide" and his
5 perspectives on the value of patents and other intellectual property assets have been cited in the
6 media, including Managing Intellectual Property, The New York Times, Forbes.com, Business
7 News Network, Business Valuation Resources, and The Democrat & Chronicle.

8 Mr. Torres is a member of the National Association of Forensic Economics, and of the Western
9 Economics Association International, among others. His career has spanned from academia, to
10 branches of government, to private industry and consulting.

11 He first earned a B.A. in Economics from the Metropolitan University in Mexico City (1980),
12 and went on to earn a Graduate Diploma in Economics from the University of East Anglia (U.
13 K., 1981), and a Master of Science Degree specializing in Econometrics from the University of
14 London, England (1982).

15 Prior to specializing in IP, his career centered on financial analysis and management in the
16 private sector, having been both a brand development consultant and an entrepreneur in several
17 business ventures, mainly in computer services and the health care industry. During the 1980s,
18 Mr. Torres was Professor of Economics at the Metropolitan University in Mexico City,
19 teaching Economic Policy, Economic Growth, Microeconomics, and Quantitative Methods.
20 Mr. Torres was later a financial consultant (NASD Series 7, 63, 65) for half a dozen years with
21 AXA Advisors LLC.

22 **PROFESSIONAL ASSOCIATIONS**

- 23
- 24 ■ National Association of Forensic Economics
- 25 ■ Western Economics Association International
- 26 ■ American Economic Association
- 27 ■ Society for Computational Economics
- 28

PUBLICATIONS

- "The Impact of Reorganization on Trademark Values," in: IP Management and Valuation Reporter, March 2012, BVR, Portland, OR.
- "Fundamental Principles of Patent Value," in: IP Management and Valuation Reporter, January 2012, BVR, Portland, OR.
- Book Chapter: "Valuation, Monetization, and Disposition in Bankruptcy" in IP Operations and Implementation for the 21st Century Corporation, John Wiley and Sons, Inc. (November, 2011).
- Chapter 15: "Copyrights" in Wiley Guide to Fair Value Under IFRS, John Wiley and Sons, Inc. (May, 2010).
- "The Road to Asia," Feature Article (co-author) in: World Trademark Review, No. 23, February/March 2010, pp. 19-22.
- "Trademark Values in Corporate Restructuring" (July, 2007). Social Sciences Research Network: <http://ssrn.com/abstract=1014741>
- "Establishing Licensing Rates Through Options" (September, 2006) Social Sciences Research Network: <http://ssrn.com/abstract=1014743> and in: http://formulatorres.blogspot.com/2006_05_01_archive.html
- Book Chapter: "Ch. 9: Recent developments in Patent Valuation" in: Practicing Law Institute, Patent Law Institute 2007: the Impact of Recent Developments on Your Practice, PLI Course Handbook (March 19, 2007).
- "Establishing Licensing Rates through Options," in: ipFrontline, September 12, 2006 (<http://www.ipfrontline.com/depts/article.asp?id=12586&deptid=3>).

SPEECHES AND PRESENTATIONS

- "What's a Brand Worth?" MCLE presentation for the California Bar Association, Intellectual Property Section, Trademark Interest Group, March 2015
- "Intellectual Property Valuation Techniques," MCLE presentation for Pillsbury Winthrop Shaw Pittman, San Diego, CA, August 2014
- "10 Common Mistakes in IP Valuation/Damages", CLE presentation to Jeffer Mangels Butler & Mitchell LLP, Los Angeles, CA, July 2014
- "Intellectual Property Valuation Techniques," MCLE presentation, San Diego, CA, April 2013
- "Intellectual Property Valuation and Monetization," a seminar for the Special American Business Internship Training (SABIT) Intellectual Property Rights program, U.S. Department of Commerce. March, 2013.

- 1 ■ “Valuing IP in the Context of Bankruptcy,” webinar for the Certified Patent Valuation
Analyst curriculum, Business Development Academy. October, 2011.
- 2
- 3 ■ “Recent Developments in Intellectual Property Economic Damages,” Presentation at the
Annual Conference of the National Association of Forensic Economics. June, 2011.
- 4
- 5 ■ “Valuing the Intangible: Where to Start?” CLE presentation to Sheppard Mullin Richter &
Hampton, LLP. December, 2009.
- 6
- 7 ■ “Defending and Enforcing Your Technology.” Panelist at: Foley’s Emerging Technologies
Conference: Navigating a New World – San Diego, CA (Foley & Lardner LLP); September
2009.
- 8
- 9 ■ “Intellectual Property Valuation, Monetization and Disposition in Bankruptcy” – CLE
presentation at the Spring Trademark Program of the NY Intellectual Property Law
Association – New York, NY; June 2009.
- 10
- 11 ■ “Damages Valuation and Expert Witnesses” (co-presenter) – CLE presentations to:
 - 12 ■ Gibson, Dunn & Crutcher LLP – Irvine, CA (June, 2008)
 - 13 ■ Arent Fox, LLP — Washington, DC (April, 2008)
 - 14 ■ Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P. – Washington,
DC (April, 2008)
- 15 ■ “Valuing Intangible Assets for Litigation” (Instructor) – National Association of Certified
Valuation Analysts (NACVA) – Fort Lauderdale, FL; December 2007
- 16
- 17 ■ “Valuing Intangible Assets for Litigation” (Instructor) – National Association of Certified
Valuation Analysts (NACVA) – Philadelphia, PA; October 2007
- 18
- 19 ■ “Trademark Values in Corporate Restructuring” – Western Economics Association
International 82nd Annual Conference – Seattle, WA; July, 2007
- 20
- 21 ■ “Entrepreneurship and Innovation” (Session Chair) – Western Economics Association
International 82nd Annual Conference – Seattle, WA; July, 2007
- 22
- 23 ■ “Alternative Focuses for ‘But For’ Scenario Specification in Commercial Litigation”
(Discussant) – National Association of Forensic Economics, Western Conference – Seattle,
WA; June, 2007
- 24
- 25 ■ “Patent Values in the Evolving I.P. Market” – Practicing Law Institute – Hot Topic Briefing
Teleconference; May 2007 (CLE Presentation)
- 26
- 27 ■ “Key Issues in Intellectual Property Due Diligence” – Due Diligence Symposium 2007 –
ACG – Iselin, NJ; April 2007
- 28

- 1 ▪ “Life Sciences IP Due Diligence” – American Conference Institute – San Francisco, CA;
2 January 2007
- 3 ▪ “Developments in Patent Valuation” – Practicing Law Institute – San Francisco, CA;
4 January 2007 (CLE Presentation)
- 5 ▪ “Collins & Aikman Europe and Other Cross-Border Asset Sales: A Tale of Two Venues” –
6 American Bankruptcy Institute, Winter Leadership Meeting – Phoenix, AZ; December
7 2006
- 8 ▪ “Valuing Intangible Assets for Litigation” (Instructor) – National Association of Certified
9 Valuation Analysts (NACVA) – San Diego, CA; December 2006
- 10 ▪ “Effective IP Litigation Support and Valuation” – LeBoeuf, Lamb, Greene & MacRae, LLP
11 – New York, NY; February 2006 (CLE Presentation)

APPENDIX B

TESTIMONY RELATED EXPERIENCE

(Past Four Years)

FERNANDO TORRES, MSc

Dates	Parties	Case No.	Court	Status	Nature	Hired by	Role
June 2011	Hebrew University of Jerusalem v. General Motors LLC	10-CV-3790	United States District Court Central District of California	Closed	Rights of Publicity, False Endorsement	Arent Fox	Expert Damages Report, Deposition
June 2011 – Sept. 2011	Laserfiche v. SAP AG, et al.	10-CV-7843	United States District Court Central District of California	Settled	Trademark Infringement.	Law Offices of R. Weiss, Buchwalter Nemer, & MaceikoIP	Expert Damages Report – Rebuttal, Deposition
February 2012	The Int'l. Aloe Science Council Inc. V. Fruit of the Earth, Inc.	11-CV-2255	United States District Court District of Maryland	Settled	Trademark Infringement.	Kane Kessler, P.C.	Expert Rebuttal Report on Damages, Depositions
March 2012	A. Fraley, et al v. Facebook, Inc.	11-CV-1726	United States District Court Northern District of California	Settled	Rights of Publicity Class Action	The Arns Law Firm	Expert Declarations in Support of Motion for Class Certification, Value of Injunctive Relief, Deposition
September - November 2013	Scidera, Inc. v. Newsham Choice Genetics, LLC	AAA 16-174-00582-12	American Arbitration Association	Closed	Contract, Database	Neymaster Goode, PC	Expert Damages Rebuttal Report, Deposition, Arbitration
February 2014	Lambert Corp. v. LBJC, Inc. et al.	13-CV-0778	United States District Court Central District of California	Settled	Copyright & Trademark Infringement	Ezra Brutzkus Gubner LLP	Expert Damages Report, Deposition
April 2014	S. Mattocks v. Black Entertainment Television LLC	13-CV-61582	United States District Court Southern District of Florida	Closed	Intangible Asset Fair Market Value	Tripp Scott PA	Declaration, Expert Damages Report, Deposition

Dates	Parties	Case No.	Court	Status	Nature	Hired by	Role
July – Aug. 2014	Tierra Intellectual Borinquen, Inc. v. Toshiba America Information Systems, Inc., and Toshiba Corporation.	13-cv-47	United States District Court Eastern District of Texas	Settled	Patent Infringement	Ferraiuoli, LLC	Expert Damages Report, Deposition
Aug. 2014	S. Abu-Lughod v. S. Calis, Tocali, Inc., ASCII Media, Inc., et al.	13-cv-2792	United States District Court Central District of California	Pending	Contract, Software IP value	Kalbian Hagerty LLP	Expert Rebuttal Report, Deposition

APPENDIX C

COMPENSATION TERMS

IPmetrics is being compensated on this engagement at a rate of \$375 per hour for all services related to the presentation of this report. Expenses are not included in the above fee and are billed separately.

Time involved in the preparation for deposition and/or trial, as well as expert testimony given in deposition and/or trial, will be compensated at the rate of \$450 per hour.

IPmetrics' compensation is not dependent, in any way, upon the conclusions reached during the performance of the analysis.